

In the Matter of)
Application No. 96-1)
)
) TESTIMONY OF STEPHEN
) BOTTHEIM
OLYMPIC PIPE LINE COMPANY)
)
) • Geologic Hazards
CROSS CASCADE PIPELINE PROJECT)
)

2. The proposed route of the Cross Cascades Petroleum Pipeline project crosses through approximately 40 miles of unincorporated King County, generally east of the cities of Duvall and Carnation, through the cities of Snoqualmie and North Bend and then south of I-90 along portions of the John Wayne Trail and existing state and U.S. Forest Service roads and Bonneville Power

1 Administration right-of-way. A pump station is proposed to be constructed east of North Bend
2 adjacent to the Cedar Falls Trail. Comments set forth in this Testimony are addressed to those
3 portions of the corridor located within King County outside of incorporated areas.

4 3. Within King County, the proposed pipeline route largely follows existing roads and
5 utility corridors; however, approximately 3.5 miles of new corridor will be created, and an
6 additional 3.5 miles of existing corridor will be widened. The corridor crosses eight different zone
7 classifications, and will cross numerous wetlands and streams. The corridor also traverses
8 designated floodways, shorelands, wetlands, and geologic hazard areas that are mapped and
9 protected by King County shoreline and critical area zoning. (See Testimony of Gillen, Finney and
10 Sandin) The right-of-way for the pipeline will be sixty feet wide except where existing trails and
11 roads are used. In these cases, the corridor will be restricted to the width of the trail or road. The
12 corridor will be reduced to thirty feet at all wetland and stream crossings that are not located within
13 existing roads or trails. Thirty feet of the right -of-way will be permanently maintained to allow for
14 aerial inspections. At wetland and stream crossings, the maintained right-of-way will be reduced to
15 10 feet except, again, if the crossing is located within an existing road or trail. The pipeline would
16 be buried underground except at the proposed crossings of the Snoqualmie River, South Fork
17 Snoqualmie River, Tokul Creek, Boxley Creek and Change Creek where the pipeline will be hung
18 from existing bridges. Other than at the bridged stream crossings and a few road crossings, the
19 balance of the pipeline will be open trenched.

20 4. The King County Comprehensive Plan is the principle planning document used by
21 King County for the orderly physical development of the county. Policies set forth in the County's
2 Comprehensive Plan are implemented through County land use regulations including, but not

1 limited to, the King County Zoning Code, KCC Title 21A (including limitations upon development
2 within sensitive areas); Surface Water Management Code, KCC Title 9 (including provisions for the
3 protection of surface and groundwater); Roads and Bridges Code, KCC Title 14 (including road and
4 utility standards); Building and Construction Standards Code, KCC Title 16 (including general
5 building, clearing and grading standards); and Shoreline Management Code, KCC Title 25
6 (including restrictions upon development within designated shorelines).

7 5. In my evaluation of this project and preparation of this Testimony, I have reviewed
8 the following documents: Olympic Pipeline Company , Application for Site Certification
9 Agreement to Washington Energy Facility Siting Evaluation Council, February 1996, amended May
10 1998, including Appendix A, Map Atlas; Draft Environmental Impact Statement, Cross Cascades
11 Pipeline, September, 1998; Geologic Map of the Skykomish River 30-by 60-Minute Quadrangle,
12 Washington, By R.W. Tabor, V.A. Frizzell, Jr., D.B.Booth, R.B.Waitt, J.T.Whetten, and
13 R.E.Zartman. I have unfortunately not had an opportunity to review the sort of detailed
14 geotechnical information King County would ordinarily expect for such a project. Such information
15 has not been provided to King County by the applicant. The geotechnical evaluation and detailed
16 alternatives analysis that were required pursuant to the October 1996 stipulated agreement were not
17 provided. Neither the revised application submitted on May 11, 1998 or the DEIS published in
18 September 1998, included the detailed geotechnical information that was sought through the 1996
19 stipulation. The DEIS does not adequately or objectively analyze or verify information developed by
20 the applicant for the Application for Site Certification (“ASC”) which results in understatement of
21 potential impacts, over- statement of the benefits of mitigation, in the elimination of alternatives

1 from detailed review, and in the improper relegation of environmental considerations to a secondary
2 role as compared with project cost considerations.

3 6. I am familiar with the pipeline siting to the extent that I flew the entire proposed
4 pipeline route, within unincorporated King County on September 30, 1998. I have additionally
5 performed a field reconnaissance of site conditions where the pipeline route crosses the north fork
6 and main channel of Cherry Creek and Harris Creek on January 14, 1999. In addition I have made a
7 field visit to the Tolt River crossing site on January 29, 1999.

8 7. King County is located on the active, tectonic Pacific "Ring of Fire," which is
9 characterized by numerous, dynamic geologic processes that include frequent earthquakes and
10 recurring volcanic eruptions. The relatively recent glacial history has left numerous steep and
11 unstable hillsides throughout the County. Snow avalanches are a common occurrence in the
12 Cascade Mountains in Eastern King County. When human activity occurs in areas subject to such
13 active geologic processes, the potential consequences to life, property and environmental integrity
14 can be enormous. If geologic processes are recognized and appropriately addressed in the course of
15 development activities, adverse consequences can be substantially reduced if not completely
16 eliminated.

17 8. King County maintains inventories and maps of geologic hazards in the *King County*
18 *Sensitive Areas Ordinance Map Folio*. However, the inventories and maps are not complete and
19 the hazard may not be discovered until the development review stage. The extreme eastern portions
20 of King County have not been mapped. (See Exhibit 1)

1 9. King County Comprehensive Plan Policy NE-402 articulates the general standard
2 against which construction activities in erosion hazard areas are measured in King County. The
3 section provides:

4 **NE-402 Land uses permitted in mapped Erosion Hazard Areas should**
5 **minimize soil disturbance and maximize retention and replacement of native**
6 **vegetative cover.**

7 10. This and other plan provisions King County has adopted to regulate development
8 within erosion hazard areas are implemented by the zoning code provisions contained in KCC
9 21A.24.220, a copy of which is attached to this affidavit at Exhibit 2. King County zoning
10 precludes development from occurring within erosion hazard areas that do not meet these minimum
11 requirements.

12 11. In order to comply with land use and zoning laws relating to erosion hazard areas
13 construction of this project must: 1) be undertaken in accordance with the general construction and
14 erosion-sedimentation control provisions; 2) adhere to the seasonal limitations for work within
15 erosion hazard areas (April 1 through September 1); and 3) comply with the following additional
16 provisions:

- 17 • An independent environmental monitor is on-site during construction
18 in geologic hazard areas, floodplains, streams, wetlands or other
19 shoreline areas to assure that there is no risk of water quality
20 impacts to receiving waters or other direct impacts to wetlands,
21 streams and other regulated sensitive areas. The environmental
2 monitor(s) will be selected by EFSEC, in consultation with the
 Washington State Departments of Ecology and Fish and Wildlife and
 the tribes. The environmental monitor(s) will report directly to
 EFSEC or their designated state agency representative and will have
 stop work authority. All costs associated with this monitoring will be
 borne by OPL. Weekly summaries of the daily inspection reports will
 be provided to King County.
- Discharge from the construction site is limited and any discharge is monitored

1 for turbidity, sediments and ph.. Turbidity caused by construction activities shall
2 not exceed Washington State Water Quality Standards. Sediment larger
3 than 0.075 mm shall not leave the site or enter wetlands, streams,
4 lakes or other natural drainage features or existing constructed
5 drainage systems which outlet to natural drainage features. A water
6 quality monitoring plan will be developed in conjunction with final
7 project design. Weekly summaries of all water quality monitoring
8 reports will be provided to King County by middle of the following
9 week; and

- 10 • If discharge from the construction site exceeds the standards
11 identified above, all work contributing to the water quality problem
12 will be immediately discontinued, other than remedial actions
13 necessary to correct the problem, and the County notified. OPL will
14 be responsible for restoration and /or compensation for impacts
15 caused by such releases.
- 16 • Wet season cover requirements will be implemented for all work occurring prior
17 to April 1 and after September 1. Construction shall be phased to further
18 reduce the amount of area open at any given time. Between September 1 and
19 September 30 any area that can not be reclaimed and revegetated within two
20 days will be covered with straw mulch. For the periods March 1 through March
21 31 and October 1 through October 31, the cover requirement shall be
22 implemented if the site can not be completed within 12 hours. After October 15,
no new construction shall be commenced and the only work that will be allowed
is final site stabilization and revegetation.
- For slopes between 15% and 40%, perimeter protection may only be used as the
sole form of sediment control when the flowpath is 125 feet or less. If the
flowpath exceeds 125 feet, perimeter protection shall be used in conjunction
with sediment traps and/or ponds. For slopes greater than forty percent see the
next section on steep slope hazard areas.
- If the erosion hazard area is located adjacent to or within 100 feet of a stream,
lake, pond, wetland or other natural drainage feature, additional perimeter
control, consisting of multiple silt fences with a higher AOS or a physical
barrier, shall be constructed to isolate the construction site from the receiving
body.
- In no event will work other than maintenance or repair of temporary erosion and
sediment control facilities be allowed between November 1 and the end of
February.

1 12. Only if the project were amended to include these additional mitigation measures
2 would construction of this project be consistent with King County laws regulating development in
3 erosion hazard areas.

4 13. Further clearing and grading limitations apply to those portions of the project that
5 involve steep slopes, or wetland and stream crossings. King County zoning code section
6 21A.24.020(D) specifies that where more than one sensitive area is involved, the provisions
7 providing the most protection to environmentally sensitive areas shall govern. Discussion of
8 applicable zoning code limitations for wetland and stream crossings is provided in separately filed
9 King County Testimony of Sandin, Gillen, and Finney. King County limitations on uses allowed in
10 steep slope hazard areas are discussed in paragraphs 14 through 15 below. King County limitations
11 on uses in landslide hazard areas are discussed in paragraphs 18 through 20 below.

12 14. Steep slope hazard areas are defined in KCC 21A.06.1230 as those areas of King
13 County on slopes 40% or steeper within a vertical elevation range of at least ten feet. In such areas,
14 the King County Comprehensive Plan specifies:

15 **NE-403. Slopes with a grade of 40 percent or more should not be developed**
16 **unless the risks and adverse impacts associated with such development can be**
 reduced to a non-significant level.

17 15. This and other plan provisions King County has adopted to regulate development on
18 steep slope hazard areas are implemented by the zoning code provisions contained in KCC
19 21A.24.310, a true and correct copy of which is attached to this affidavit at Exhibit 3. King County
20 zoning precludes development from occurring within steep slope hazard areas that does not meet the
21 minimum requirements specified in KCC 21A.24.310. Utility corridors are generally allowed on
2 steep slopes provided that special studies demonstrate that alteration of the slope will not subject

1 the area to the risk of landslides or erosion. Site specific special studies will be required for the final
2 design phase of the project. Location of the pipeline on steep slopes must further satisfy the
3 following requirements of the King County Surface Water Design Manual:

- 4 • Construction on steep slope hazard areas will be subject to the general
5 construction provisions and the erosion hazard area provisions as supplemented
6 herein. On slopes between 40% and 50%, perimeter protection may only be
7 used as the sole form of sediment control if the flowpath is less than 115 feet
8 unless the top or toe of the slope is within 50 feet of a stream, pond, lake,
9 wetland, or other natural water body. If these criteria are not satisfied or if the
10 slope exceeds 50% with a vertical rise of ten feet or greater, perimeter
11 protection must be used in conjunction with sediment traps and/or ponds and
12 interceptor swales or dikes. Interceptor swales/dikes shall be placed at the top
13 and toe of the slope with a maximum horizontal spacing of 50 feet between
14 them. Swales/dikes shall discharge to a stable conveyance system that routes
15 the runoff to a sediment pond or trap. If the dike or swale is intercepting runoff
16 from an undisturbed area, the runoff shall be routed around the construction
17 area through a stable conveyance channel and released at a stabilized outlet.
- 18 • All disturbed areas shall be promptly revegetated upon the completion of
19 construction in the steep slope area. For slopes with a vertical elevation range
20 greater than 20 feet, sloped areas will be mulched and netted in addition to
21 being hydroseeded. Hydroseeding will also be supplemented with plantings of
2 native shrubs and trees to provide additional root strength in the disturbed soils.
- A detailed revegetation plan will be prepared in conjunction with final project
design. The plan will include provisions for monitoring and maintenance and a
contingency plan to assure that performance standards (minimum 80% survival
rate after five years) are achieved.

17 16. Landslide hazard areas are defined in KCC 21A.06.680 as those areas in King
18 County subject to severe risks of landslides, including the following: (A) Any area with a
19 combination of slopes greater than 15%, impermeable soils interbedded with granular soils, and
20 springs and ground water seepage; (B) Any area that has shown movement during the Holocene
21 epoch, from 10,000 years ago to the present, or which is underlain by mass wastage debris from that
2 epoch; (C) Any area potentially unstable as a result of rapid stream incision, stream bank erosion or

1 undercutting by wave action; (D) Any area which shows evidence of or is at risk from snow
2 avalanches; or (E) Any area located on an alluvial fan, presently subject to or potentially subject to
3 inundation by debris flows or deposition of stream transported sediments.

4 17. Construction in these areas is expensive and difficult. Landslides following
5 development can result in enormous public and private costs and severe threats to human health and
6 safety. Such landslides can cause severe natural resource damage. Mapped landslide hazard areas
7 are present throughout the proposed pipeline corridor. In the lower Snoqualmie Valley, they are
8 generally found along the major streams and rivers and along the east valley wall. Above
9 Snoqualmie Falls, landslide features are present at all of the stream crossings from Boxley Creek
10 east to Snoqualmie Summit. OPL has conducted some preliminary investigations and has identified
11 20 areas that have a moderate to high potential for mass wasting. Thirteen of these locations are
12 located on slopes of 40 percent or greater. Landslide hazard areas have been identified on each side
13 of the proposed crossings of Cherry Creek, Griffin Creek, Boxley Creek and the Tolt River.

14 18. The following Comprehensive Plan Policy applies to development or siting of
15 facilities in Landslide Hazard Areas:

16 **NE-404 Avalanche or Landslide Hazard Areas should not be developed**
17 **unless the risks and adverse impacts associated with such development can**
be reduced to a non-significant level.

18 19. This and other plan provisions are implemented by the zoning code provisions
19 contained in KCC 21A.24.280, a true and correct copy of which is attached tot his affidavit as
20 Exhibit 4. King County zoning precludes development within landslide hazard areas that does not
21 comply with these minimum requirements.

1 20. King County zoning allows alterations to landslide hazard areas only where a special
2 study shows that the alteration will not decrease slope stability on contiguous properties and where
3 mitigation is implemented, based upon the best available engineering and geological practices,
4 which minimizes the risk of damage, death or injury resulting from landslides. In order to comply
5 with County land use regulations relating to landslide hazard areas, construction of this project
6 through landslide areas must not only meet those standards governing steep slope hazard areas
7 discussed in paragraph 15 above, but must also satisfy the following requirements and the
8 requirements outlined in paragraph 21:

- 9 • A reconnaissance level geotechnical study will be completed for all landslide
10 hazard areas that are encountered that have not been previously evaluated. A
11 detailed geotechnical evaluation, including sub-surface exploration and
12 monitoring, will be completed for all areas that the geotechnical engineer
13 determines warrant additional study. The recommendations of the geotechnical
14 engineer will be incorporated into the final design. In the event the
15 geotechnical engineer can not unconditionally certify that the proposed
16 construction will not decrease slope stability on adjacent properties or that the
17 proposed construction can not be mitigated to eliminate or minimize the risk of
18 landsliding, the project shall be rerouted to avoid the landslide hazard area.
- 19 • Landslide hazard areas have been specifically identified on each side of the
20 proposed crossings of Cherry Creek, the Tolt River and Griffin Creek. The
21 toe of the landslide on the southern slope of Cherry Creek is located in the
2 thalweg of the creek. There have been recent slides (within the past two or
three years) immediately downstream of the proposed crossing that have
partially blocked the main channel. Because of the relative location of the
stream channel to the to the slide area, significant permanent impacts will be
created with any slope stabilization efforts. The landslide block south of the
Tolt River side channel is a large deep seated failure. It is estimated to be about
a half-mile wide and approximately 450 feet high and has a history of
movement. Extensive geotechnical exploration and evaluation must be
required to reasonably understand the dynamics of this landslide. There is
insufficient information available at this time to determine if this project will
create a significant, unavoidable, unmitigatable impact upon the environment.
Similarly, there is insufficient information available to evaluate the landslide
areas located north and south of Griffin Creek. Significant wetland and stream
resources are at risk from a failure of any these slopes. (see Testimony of

1 Gillen and Finney). In order to comply with County land use regulations
2 relating to landslide hazard areas and to comply with the relevant King County
3 wetland, stream and shoreline regulations (see Testimony of Gillen, Finney
4 and Sandin) the following additional measure should be included as
5 supplemental mitigation.

- 6 • The pipeline route shall be located to avoid steep slope and landslide hazard
7 areas that are located adjacent to or within 100 feet of a wetland or Class 2
8 stream, within 200 feet of a Class 1 stream or is within 100 feet of a wetland or
9 floodplain associated with a Class 1 stream, except that, if the pipeline route is
10 following an existing road or trail that traverses a steep slope or landslide
11 hazard area and the pipeline construction is limited to the developed trail or
12 road bed, this provision may be waived and the general provisions listed in
13 paragraph 20 above shall be applied.

14 22. King County is an earthquake prone region subject to ground shaking and seismically
15 induced liquefaction of soil. Areas with low density, granular and saturated soils are likely to
16 experience greater damage from earthquakes. Seismic hazard areas are defined in KCC
17 21A.06.1045 as areas subject to severe risk of earthquake damage as a result of soil liquefaction.

18 23. The following Comprehensive Plan policy applies to the development or siting of a
19 facility within a Seismic Hazard Area:

20 **NE-406. In areas with severe seismic hazards, special building design
21 and construction measures should be used to minimize the risk of
22 structural damage, fire and injury to occupants and to prevent post-
23 seismic collapse.**

24 24. This and other County seismic hazard area policies are implemented by KCC
25 21A.24.290 (precluding development within seismic hazard area unless mitigation, based upon the
26 best available engineering and geological practices, is implemented which eliminates or minimizes
27 the risk of damage, death or injury); King County Code 16.04.050 (adopting UBC §§ 1804.2, 3, and
28 5 required geotechnical evaluation of liquefaction where ground motion that is modeled is one that,
29 at a minimum, has a 10% probability of being exceeded in 50 years); and KCC 21A.24.070

1 (exceptions to seismic standards may only be allowed if no practical alternative exists with less
2 impact on the sensitive area, and the proposal minimizes impacts to sensitive areas). King County
3 zoning precludes development from occurring within seismic hazard areas unless these minimum
4 requirements are satisfied.

5 25. The pipeline corridor crosses three seismic zones. These are located at the Cherry
6 Creek – North Fork Cherry Creek crossing, the Tolt River Crossing, and the Snoqualmie River
7 crossing near the City of Snoqualmie. The specific engineering characteristics of the soil deposits at
8 the two lower valley crossings recommendations by the and in the vicinity of the Snoqualmie River
9 Crossing are not and should be disclosed in the documents. It is expected that seismic hazards can
10 be mitigated through pipe design geotechnical engineer in the final design phase. In addition, since
11 these seismic hazard areas coincide with flood hazard areas, thicker walled pipe will be used which
12 will provide an added level of protection.

13 26. In order to comply with County land use plans and zoning relating to seismic hazard
14 areas, this project would need to comply with floodplain provisions identified in the Testimony of
15 Parsons and Butler and the following:

- 16 • Site specific geotechnical engineering studies shall be performed for all seismic
17 hazard areas crossed by the pipeline. These studies shall include soil borings to
18 depths adequate to fully characterize the potential for soil liquefaction. The study
19 shall provide recommendations for hazard mitigation where appropriate.
- 20 • All existing bridges that are proposed to be used to support this pipeline shall be
21 evaluated to determine that they are structurally sound. The geotechnical report
22 will consider the adequacy of these structures based upon a seismic event that has a
23 10% probability of being exceeded in 50 years. The report shall also address the
24 potential for differential settlement where the pipe is rigidly connected to bridge
25 structures, potential adverse impacts on the pipe and recommended mitigations.
26 The recommendations of the geotechnical engineer to seismically retrofit these
27 structures shall be incorporated into the final construction drawings.

27. King County strongly believes that any site certification recommendation by the Council should insist on adherence to the foregoing carefully crafted standards that have been established to properly control potentially serious impacts of development within geologic hazard areas discussed above.

DATED this 11th day of February, 1999.

STEPHEN BOTTHEIM